120 AF/GP3752

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

#46

In re application of

Norihisa FUKUTOMI, *et al.*

Docket No: Q56091

Appln. No.: 09/413,348

Group Art Unit: 3752

Confirmation No.: 1912

Examiner: CHRISTOPHER S. KIM

Filed: October 6, 1999

For: FUEL INJECTION VALVE

SECOND SUPPLEMENTAL APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Please note that this Supplemental Appeal Brief is being filed in response to the second Notification of Non-Compliance dated June 17, 2004 (a first Notification of Non-Compliance was issued on May 18, 2004). This second Supplemental Appeal Brief is substantially the same as the Supplemental Appeal Brief filed on June 3, 2004, except the word "only" is removed from the excerpt of claim 2 on page 5 of this Brief.[1]

In accordance with the provisions of 37 C.F.R. § 1.192, Appellant submits the following:

The following comprises Appellant's Brief on Appeal from the final rejection dated August 1, 2003, rejecting claims 2 and 6-9. This Appeal Brief is filed in triplicate and is

[1] Although not mentioned by the Examiner, "only" is also removed from page 4, line 4 of previously filed Supplemental Appellant's Brief on Appeal.

accompanied by the required appeal fee as set forth in 37 C.F.R. § 1.17(c). Appellant's Notice of Appeal was filed on January 2, 2004. The present Appellant's Brief on Appeal is timely filed.

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee, MITSUBISHI DENKI KABUSHIKI KAISHA.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 2-9 are all the claims pending in the application. Claims 3-5 are withdrawn from consideration. Claim 2 stands rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claims 2 and 6-9 stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Reiter. Claims 6-9 also stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Asano.

IV. STATUS OF AMENDMENTS

No amendments have been entered subsequent to the final action, however Appellant submits herewith an Amendment for the purpose of overcoming the 35 U.S.C. § 112, second paragraph, rejection of Claim 2, made in the Final Rejection of August 1, 2003, and respectfully requests that the Examiner enter the enclosed Amendment. The enclosed amendment simply changes "a" to "said" in claim 1, but does not add the limitation "only" to claim 1, which the

Examiner indicated would require further search and/or consideration, in the Advisory Action dated November 10, 2003. Appellant submits that changing "a" to "said" overcomes the § 112, second paragraph, rejection, and therefore the only issues on appeal are the prior art rejections.

V. SUMMARY OF THE INVENTION

The present invention is directed to a fuel injection valve that can generate effective damping relative to the change of fuel pressure when a needle valve is closed, thereby decreasing the generation of after-dripping of injection right after a needle valve is closed. *See page 3, second full paragraph of present specification.* Conventionally, after-dripping occurs in fuel injection values due to bouncing after a valve-closing collision, and the after-dripping exerts a negative influence on the combustion quality of the engine.

To overcome the problems of after-dripping in the conventional art as discussed above, in an exemplary embodiment, as described in claim 2, for example, the present invention provides a fuel injection valve for opening and closing a needle valve by driving an armature with a solenoid. The fuel injection valve comprises a needle valve, an armature, a solenoid that comprises a coil, and a buffer portion for damping a change of fuel pressure caused by valve bounce when the needle is closed. The buffer portion can be an elastic member disposed at a position at which the buffer portion faces and contacts a fuel passage located at an upstream side with respect to an end face of the armature located on a side of a nozzle opening side. The elastic member can be provided between a sleeve and the core in order to form the buffer portion. In an exemplary embodiment, a sleeve can be disposed between a core and a valve holder of the solenoid, the elastic member can be attached to a portion of the sleeve located near

an end portion of said coil, and the elastic member can extend in a perpendicular direction away from the sleeve toward the core.

VI. ISSUES

This appeal presents the following issues:

1. Whether the subject matter of claims 2 and 6-9 is anticipated under § 102(e) over *Reiter*.

2. Whether the subject matter of claims 6-9 is anticipated under 35 U.S.C. § 102(b) over *Asano*.

VII. GROUPING OF CLAIMS

For purposes of the present appeal, the rejected claims do not stand or fall together. Specifically, the rejected claims are divided into the following separately patentable groups.

Group 1: Claim 2.

Group 2: Claim 6.

Group 3: Claim 7.

Group 4: Claim 8.

Group 5: Claim 9.

Appellant believes that claims 2 and 6-9 do not stand or fall together at least because each of the respective claims generally have combinations of elements which are not shared by each other, and thus Appellant believes that the pending claims do not stand or fall together.

For example, claim 2 does not stand or fall together with claims 6-9 at least because claim 2 recites, in part, the following limitations, which are not disclosed in any of claims 6-9:

> a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, said buffer portion being an elastic member disposed at a position at which said buffer portion faces and contacts a fuel passage located at an upstream side with respect to an end face of said armature located on a side of a nozzle opening side,
>
> wherein said elastic member is provided between a sleeve and said core in order to form said buffer portion, said sleeve being disposed between a core and a valve holder of the solenoid, said elastic member being attached to a portion of said sleeve located near an end portion of said coil, said end portion of said coil being the end portion of said coil nearest to said needle valve with respect to an opposite end portion of said coil, and said elastic member extending in a perpendicular direction away from said sleeve toward said core.

Claims 6-9 recite the following limitations, respectively, which are not shared by any of the other claims that are pending on appeal: "wherein said buffer portion contacts fuel in said fuel passage and said buffer portion is located between said sleeve and a core of said fuel injection valve", "wherein said buffer portion is located between said sleeve and a core of said fuel injection valve and said buffer portion contacts fuel in said fuel passage", "said means being an elastic member disposed at a position at which said means faces and contacts a fuel passage located at an upstream side with respect to an end face of said armature located on a side of a nozzle opening side," and "said means being an elastic member disposed at a position at which said means faces and contacts a fuel passage located at an upstream side with respect to an end face on a nozzle opening side of said armature." Therefore, at least based on the foregoing, Appellant submits that the pending claims are separately patentable over the prior art, and do not stand or fall together.

VIII. ARGUMENTS

1. Claims 2 and 6-9 are not anticipated under 35 U.S.C. § 102(e) over *Reiter*.

Appellant submits that the present invention, as recited in claims 2 and 6-9, is patentable over Reiter, at least based on the following reasons. In the Office Actions dated March 21, 2003 and August 1, 2003, to support the rejections of claims 2 and 6-9, the Examiner simply asserted,

> Reiter discloses a fuel injection valve comprising: a needle valve 18; an armature 21; a solenoid/coil 1; an elastic member 35; a sleeve 33, 34; a core 2; a valve holder 13, 16.

With respect to independent claim 2, Appellant submits that Reiter does not teach or suggest at least "said elastic member extending in a perpendicular direction away from said sleeve toward said core," as recited in claim 2. That is, the Examiner alleges that elastic member 35 of Reiter, which is actually a seal ring (*see col. 3, line 40 of Reiter*), corresponds to the claimed elastic member of claim 2, however the seal ring 35 of Reiter clearly does not extend in a perpendicular direction away from the alleged sleeve 33 (which is actually called a ring projection in Reiter) toward the tubular core 2 of Reiter. The seal ring 35 of Reiter only extends in a vertical direction towards a top portion of the fuel injection valve, but does not extend toward the core, as described in claim 2. Further, the alleged sleeve 33 of Reiter is located vertically below the sealing ring 35 of Reiter and the tubular core 2 of Reiter is located horizontally adjacent to the alleged sleeve 33, therefore, at least based on this configuration it is clear that the sealing ring 35 of Reiter does not extend in a perpendicular direction away from the alleged sleeve 33 toward the core, and thus the limitations of claim 2 are NOT satisfied by Reiter.

Also, with respect to claim 2, Appellant submits that Reiter does not teach or suggest at least "a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed," as recited in claim 2. That is, as evident by its name, the seal ring 35 of Reiter only performs a sealing function but does NOT dampen a change of fuel pressure caused by valve bounce as described in claim 2.

Further, with respect to claim 2, the Examiner, in responding to Appellant's previous arguments in the Amendment dated June 13, 2003, alleged in the *Response to Arguments* section of the Office Action dated August 1, 2003 that, in Reiter, "the O-ring inherently functions as a buffer portion," and that the present specification discloses that the buffer portion is a rubber ring. In response, Appellant submits that even if the sealing ring 35, or O-ring, of Reiter is a rubber ring, there is no teaching or suggestion in Reiter that such sealing ring would act as a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, as described in claim 2. That is, as argued in previous Amendments, the sealing ring 35 of Reiter only performs a sealing function, even if, *assuming arguendo*, it is made of rubber.

Therefore, at least based on the foregoing, Appellant submits that independent claim 2 is patentably distinguishable over Reiter.

With respect to independent claim 6, Appellant submits that Reiter does not teach or suggest at least "a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed," as similarly argued with respect to claim 2. Further, with respect to claim 6, Appellant submits that Reiter does not teach or suggest "wherein said buffer portion is located between said sleeve and a core of said fuel injection valve," as recited in claim 6. That

is, Reiter clearly does not show seal ring 35 between tubular core 2 and ring projection 33, which allegedly corresponds to the claimed sleeve. As explained above with respect to claim 2, the arrangement of the alleged sleeve 33, sealing ring 35, and core 2 of Reiter does not allow the sealing ring (the alleged buffer portion) to be between the sealing ring 35 and core 2, as the alleged sleeve 33 of Reiter is located vertically below the seal ring 35 of Reiter, and the tubular core 2 of Reiter is located horizontally adjacent to the alleged sleeve 33. Therefore, at least based on the foregoing, Appellant submits that independent claim 6 is patentably distinguishable over Reiter.

Appellant submits that independent claim 7 is patentable for the same reasons set forth above for claim 6. With respect to claims 8 and 9, Appellant submits that these claims are patentable at least because Reiter does not teach or suggest at least "means for damping a change of fuel pressure caused by valve bounce when the needle as closed," as similarly argued above with respect to claim 6.

Further, contrary to the Examiner's assertion, Appellant submits that the members 33, 34 of Reiter are nothing but protruded portions of a support ring, and are not sleeves, as described in claims 2, 6, and 7. Moreover, the members 33, 34 appear to put stress on the elastic member (35) such that that the elastic member's side face merely faces the fuel path, which results in the elastic member simply being pushed against the member (33), for example, by fuel pressure. Such a configuration of Reiter does not permit the elastic member (35) to effectuate damping of the change of fuel pressure occurring at the time when the needle valve is closed.

Therefore, at least based on the foregoing, Appellant submits that claims 2 and 6-9 are each separately and patentably distinguishable over Reiter.

2. Claims 6-9 are NOT anticipated under 35 U.S.C. § 102(b) over Asano.

Appellant submits that the present invention, as recited in claims 6-9, is patentable over Asano, at least based on the following reasons. Asano has been applied as prior art since the Office Action dated May 7, 2001. In asserting that Asano supports the rejections of claims 6-9, the Examiner has maintained the following:

> Asano discloses a fuel injection valve comprising: a needle valve 31; an armature 32; a solenoid 44; a sleeve 22; a buffer portion/means for damping 39 being an elastic member (O-ring); a fuel passage 22f; an end face (down stream side of 32); a nozzle opening 27; a core 36. O-ring 39 inherently functions as a buffer portion.

First, as previously argued before the Examiner, Appellant maintains that Asano does not teach or suggest at least "a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, said buffer portion being an elastic member disposed at a position at which said buffer portion faces and contacts a fuel passage located at an upstream side with respect to an end face of said armature located on a side of a nozzle opening side," as recited in claim 6. The O-ring in Asano only acts as a sealing means. *See column 2, lines 49-54, see also column 3, lines 11-14 of Asano.* Thus, Asano fails to teach or suggest an elastic member O-ring which acts as a buffer, where the buffer results in a damping such that it is possible to control injection after-dripping.

Further, similar to the argument above with respect to Reiter, the Examiner alleges that the "elastic properties of the O-ring inherently functions as a buffer portion", however, similar to

Appellant's arguments above, Appellant maintains that there is nothing in Asano that teaches or suggests that what is clearly indicated as a sealing means would also satisfy the claimed "buffer portion..." of the present invention. Appellant submits that the Examiner is utilizing impermissible hindsight reasoning in concluding that the sealing means of Asano satisfies the claim limitation of a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, as described in claim 6.

Further, Appellant submits that it is NOT inherent that the sealing means of Asano satisfies the claimed "buffer portion..." of the present invention, as recited in claim 6. If the prior art reference "necessarily functions in accordance with, or includes, the claimed limitations," then it anticipates under the principles of inherency. *Telemac Cellular Corp. v. Topp Telecom, Inc.* 247 F.3d 1316, 1327 (Fed. Cir. 2001). In the present instance, Asano only discloses that the O-ring acts as a sealing, and the O-ring does not necessarily function as a buffer portion for damping a change of fuel pressure caused by valve bounce when the needle is closed, as described in claim 6, at least because nowhere does Asano explicitly or implicitly mention damping a change of fuel pressure as an object of the invention of Asano. Yet further, the Examiner has not demonstrated that damping a change of fuel pressure caused by valve bounce when the needle is closed must necessarily occur by way of the O-ring of Asano.

Further, with respect to claims 6 and 7, Appellant submits that Asano does not teach or suggest at least "wherein substantially all of said buffer portion contacts fuel in said fuel passage," as set forth in claims 6 and 7. That is, as argued in the Amendment dated July 19, 2002, since Appellant's invention, as recited in claim 6, does not employ an O-ring for the

purpose of sealing (as does Asano), the claimed buffer portion is used in the condition of being immersed in the fuel so that almost the entire surface of the buffer portion contacts the fuel.

Yet even further, with respect to the present invention, as recited in claims 6 and 7, Appellant submits, at least according to the exemplary embodiment shown in Fig. 1 of the present invention, that the sealing member is disposed at a lower pressure side with respect to the elastic member (O-ring) and thus the elastic member is placed in such a condition that the fuel pressure is exerted to the elastic member at the peripheral portion of the buffer portion (thus, "substantially all of said buffer portion contacts fuel in said fuel passage"). Thus, for example, a result of the claimed invention is that pulsational pressure change can be damped utilizing elastic deformation of the entire surface of the elastic member.

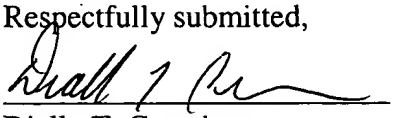
On the other hand, because the structure according to Asano employs the elastic member for sealing, the elastic member of Asano is placed in the condition that it is pushed toward the member (40). Thus, even if, *assuming arguendo,* the elastic member of Asano performs a damping function, only a small part of the surface of the elastic member can be utilized for the purpose of damping of pressure change. That is, because of the smallness of diameter of Asano's O-ring, it does not practically have an area to be contacted with the fuel and such a configuration can not bring the O-ring to assume a role of an effective damping responding to the change of the pressure occurring at the close of the needle valve; and as a result a significant pressure difference between the upstream side and downstream side of the needle valve can not occur. Thus, according to Asano's constitution, a load for suppressing the bouncing taking place after the collision of the needle valve at its closing can not act on the needle valve, resulting in

after-dripping of the fuel due to the bouncing; and this occurrence results in an adverse effect on the engine combustion. Therefore, at least based on the foregoing, Asano clearly does not satisfy the limitations of claims 6-7, including at least the claimed limitation "wherein substantially all of said buffer portion contacts fuel in said fuel passage," as recited in claims 6 and 7.

With respect to claims 8 and 9, Appellant maintains the arguments presented in the previous Amendment of July 19, 2002. That is, Appellant submits that Asano does not teach or suggest at least "means for damping a change of fuel pressure caused by valve bounce when the needle is closed," as recited in claims 8 and 9. Appellant submits that Asano only mentions that the O-ring disclosed therein performs a sealing function, and does not mention damping a change of fuel pressure caused by valve bounce when the needle is closed, as recited in independent claims 8 and 9. Further, Appellant notes that claims 8 and 9 utilize means-plus-function language in an effort to distinguish over Asano, as Asano does not teach or suggest an O-ring that performs a damping function. Therefore, at least based on the foregoing, Appellant submits that independent claims 8 and 9 are patentably distinguishable over Asano.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

CLAIMS 2 AND 6-9 ON APPEAL:

2. A fuel injection valve for opening and closing a needle valve by driving an armature with a solenoid, said fuel injection valve comprising:

said needle valve;

said armature;

said solenoid comprising a coil; and

a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, said buffer portion being an elastic member disposed at a position at which said buffer portion faces and contacts a fuel passage located at an upstream side with respect to an end face of said armature located on a side of a nozzle opening side,

wherein said elastic member is provided between a sleeve and a core in order to form said buffer portion, said sleeve being disposed between said core and a valve holder of the solenoid, said elastic member being attached to a portion of said sleeve located near an end portion of said coil, said end portion of said coil being the end portion of said coil nearest to said needle valve with respect to an opposite end portion of said coil, and said elastic member extending in a perpendicular direction away from said sleeve toward said core.

6. A fuel injection valve for opening and closing a needle valve by driving an armature with a solenoid, said fuel injection valve comprising:

said needle valve;

said armature;

said solenoid;

a sleeve; and

a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, said buffer portion being an elastic member disposed at a position at which said buffer portion faces and contacts a fuel passage located at an upstream side with respect to an end face of said armature located on a side of a nozzle opening side,

wherein said buffer portion contacts fuel in said fuel passage and said buffer portion is located between said sleeve and a core of said fuel injection valve.

7. A fuel injection valve for opening and closing a needle valve by driving an armature with a solenoid, said fuel injection valve comprising:

said needle valve;

said armature;

said solenoid;

a sleeve; and

a buffer portion damping a change of fuel pressure caused by valve bounce when the needle is closed, said buffer portion being an elastic member disposed at a position at which said buffer portion faces and contacts a fuel passage located at an upstream side with respect to an end face on a nozzle opening side of said armature,

wherein said buffer portion is located between said sleeve and a core of said fuel injection valve and said buffer portion contacts fuel in said fuel passage.

8. A fuel injection valve for opening and closing a needle valve by driving an armature with a solenoid, said fuel injection valve comprising:

said needle valve;

said armature;

said solenoid; and

means for damping a change of fuel pressure caused by valve bounce when the needle is closed, said means being an elastic member disposed at a position at which said means faces and contacts a fuel passage located at an upstream side with respect to an end face of said armature located on a side of a nozzle opening side.

9. A fuel injection valve for opening and closing a needle valve by driving an armature with a solenoid, said fuel injection valve comprising:

said needle valve;

said armature;

said solenoid; and

means for damping a change of fuel pressure caused by valve bounce when the needle is closed, said means being an elastic member disposed at a position at which said means faces and contacts a fuel passage located at an upstream side with respect to an end face on a nozzle opening side of said armature.